

Future Urban Growth Of The Imperial Valley

By

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The Imperial Valley is unique in that for much of its history it was seen as a place to travel through to somewhere else; it was not a destination but a corridor to other destinations. During the 18th and much of the 19th centuries, Spanish soldiers, missionaries, settlers, trappers, traders and gold miners came through the valley; some paused briefly but most scurried through the valley as quickly as possible to the other side for that was where their fortunes lay. Surveyors from the United States looking for a southern route for the railroad in 1854 dashed through the valley, gladly leaving a place they thought too dry and harsh for settlement.

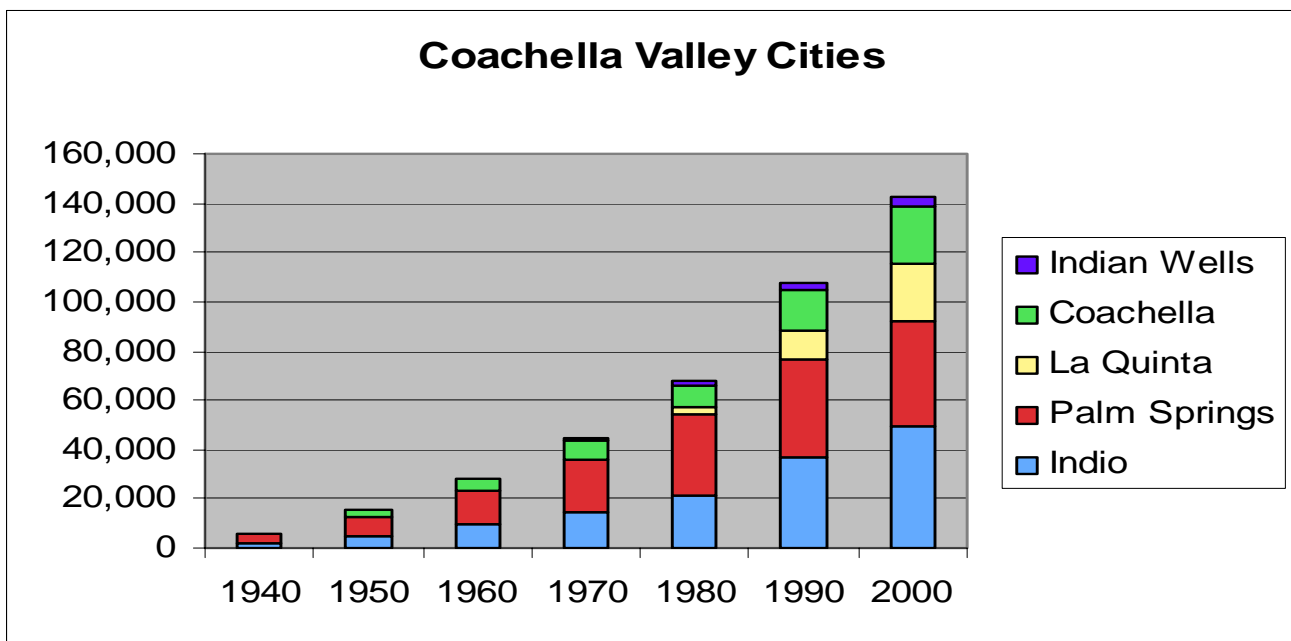
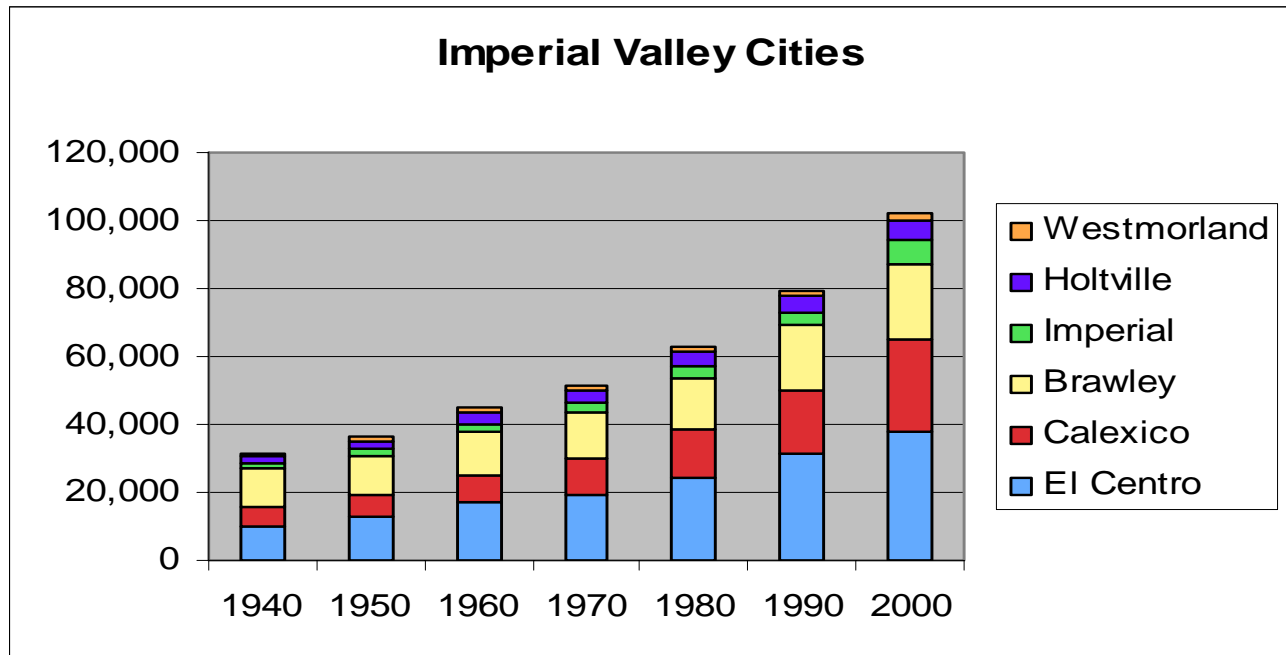
For many early travelers, the valley was a bleak, inhospitable place that called upon would be settlers for more than they might be willing to give. It was a place that could easily be bypassed for more temperate and convenient places along California's coast.

The latter part of the 19th century however, brought a reassessment of the Imperial Valley. Water was diverted from the Colorado River into the valley. With water, fertile soils and willing farmers, the Imperial Valley finally became a destination. The valley grew slowly at first, but by the First World War, the Imperial Valley was well along its way to becoming the dominant winter vegetable growing region in North America. At the turn of the 20th century, the Imperial Valley became California's last agricultural frontier.

During the ensuing years, the Imperial Valley's population increased at a gradual, consistent pace with an economic base dependent on agriculture. In 1910, the Imperial Valley's population was slightly more than 13,000. In 1950, it had reached 63,000 and by 2000 it stood at 142,000. Meanwhile, California's population surged from 10 million in 1950 to more than 34million in 2000 and is estimated to reach 51 million by 2040. To the north, the Coachella Valley's population began to increase rapidly during the 1980's due to new demand for recreation and retirement housing (Figure 1).

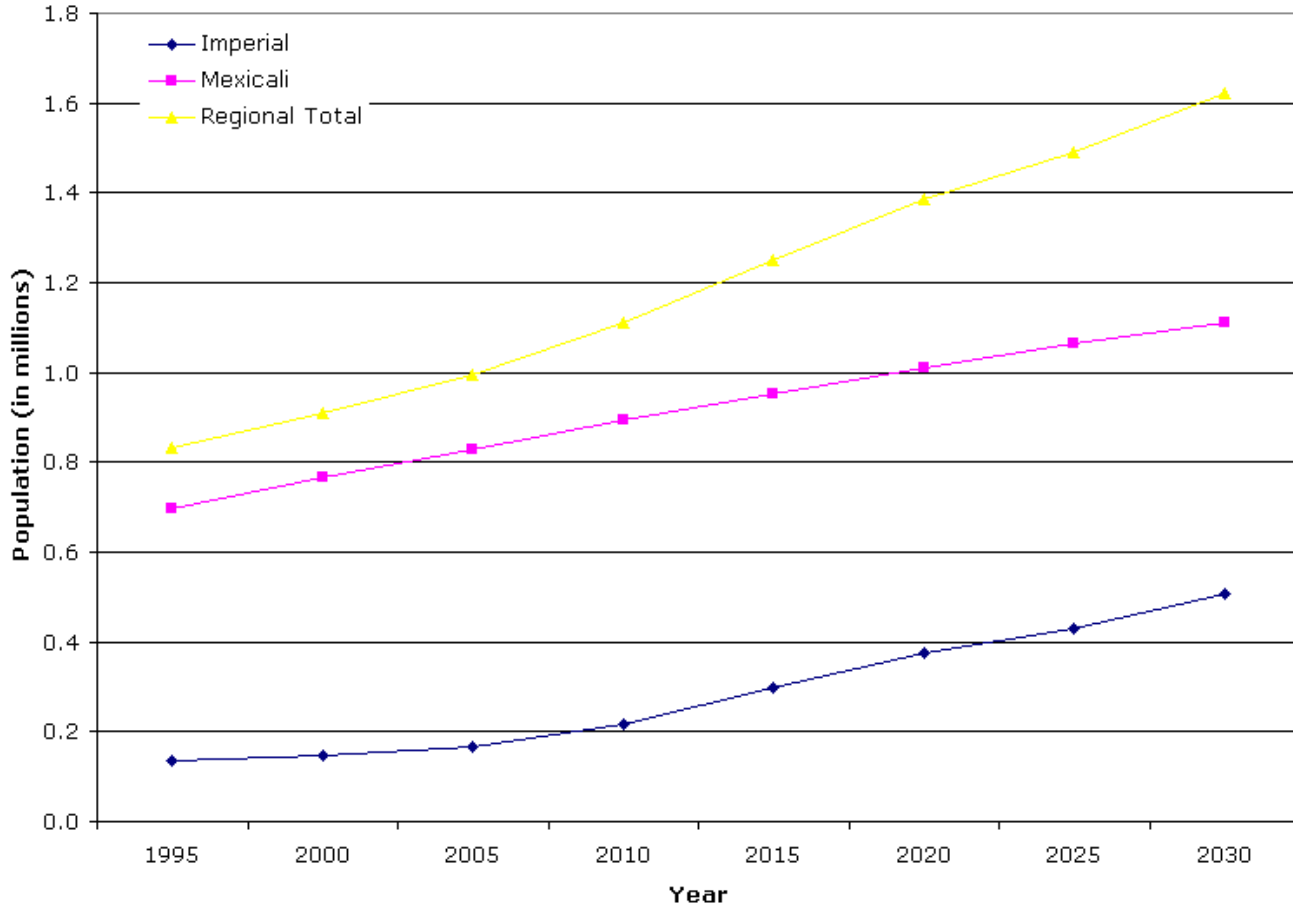
To the south Mexicali's population has also forged well ahead of the Imperial Valley during the 20th century. Since it's beginning in the early 1900s, Mexicali jumped from a small agricultural village to a population of almost 1 million. Interestingly, a combined Mexicali and Calexico urban area would have a collective population of over 1.6 million in 2030 (Figure 3).

It is within this context that I have been asked to provide the answer two questions: 1) what will the population be in the Imperial Valley in 2075? And 2) what will an urban Imperial Valley look like in 2075?



Imperial-Mexicali Population Projection

Project Projection



Recognizing the inherent difficulties with such long-range projections, I proceeded with the following assumptions:

1. That the Salton Sea will be rescued and become a major asset to the valley in terms of stimulating tourism, recreation, population growth and urban development.
2. If water is optimtimized, the valley will have more than enough water to support agriculture and urban growth well into the future.
3. The valley has ample land and a basic infrastructure that can be expanded to handle growth.
4. That agriculture and urban development can coexist.
5. That the product of this research would not be a prediction, but rather one view, among many, of what an urban Imperial Valley might look like in 2075.

6. The growth will occur regardless of whether or not the Salton Sea and Mexico receive enough water to optimize their assets but the quality of the development will depend on the willingness to optimize the water resources for the entire region.

Figure 3 depicts the area of urban growth by 2075 and is based on a computer simulation model that estimates potential urban growth (see attachment A for formula and technical details). Briefly, to set up the model, the entire Imperial Valley was converted to 250-meter square grids; each grid was evaluated for its potential to move from agriculture to urban for each year to 2075. Once a grid was identified as urban, it was no longer considered as a potential target for change. No attempt was made to identify specific land use types, such as industrial parks or low-income housing.

This future scenario is much different than the valley's current urban pattern. It is a picture that represents 230,000 acres of urban development and 105,000 acres of urban recreation around the Salton Sea. Overall, there would be an approximately 50% reduction in agricultural acres from the present use.

The projected growth follows two main thrusts. One involves an urban corridor that runs from Mexicali through El Centro to Brawly and then towards the Salton Sea. A second corridor moves west from El Centro along the highway towards San Diego. What the map illustrates in a dramatic way is not the specifics of urban growth but what the general shape and form urban growth will take. This broad pattern is driven primarily by two factors: (1) constraints to development created by land ownership patterns, particularly federal ownership of large areas to the north and west of the

Salton Sea, and (2) existing infrastructure, particularly transportation and water distribution improvements. These drivers are already in place, and their future effects can generally be predicted. Thus, even though the details of a 75-year growth forecast may be uncertain, the general pattern of future development can be discerned.

If the urban area expands as suggested in Figure 3, the population would total approximately 1.7 million in 2075. This population estimate was derived through two separate procedures that produced similar results. The first approach was to identify yearly growth rates for 75 consecutive years. In order to determine a reasonable growth assumption, I investigated the growth rates of all California counties since 1850, trying to determine if there were any comparable patterns that could be used for Imperial County. Almost all counties grew at different rates at different time with little in common, except for counties in Southern California, which had similar growth.

I selected Riverside County's annual growth rate beginning in 1945 to the present because it most closely matched the growth rates for all southern California counties and is fairly representative of the state's growth rate for the same time period. The 1.7 million-population estimate was calculated by applying Riverside's growth rate since 1945 to the Imperial Valley beginning in 2001. A small growth rate was added for each additional year to complete the 75-year projection.

A second method used was to determine the population by calculating population density. I considered the population densities of Phoenix, Las Vegas, and Tucson: areas similar in climate and morphology to the Imperial Valley. I used Phoenix's density of 3267 persons per square mile because it represents the middle value between Las Vegas and Tucson. With 519 square miles of urban development, including the area around the Salton Sea, and applying a population density of 3,267 per square mile, the population would be 1.58 million in 2075.

This is comparable to the level of growth in the reference areas. For example, between 1950 and 2000, the population of Riverside County increased from 170,000 to more than 1.5 million. The Las Vegas metropolitan area had 270,000 people in 1970; today it has 1.6 million people. What these examples illustrate is that it is reasonable to predict that the Imperial Valley will reach a population of 1.7 million in the next 70 or so years. Further supporting this assessment is the fact that there are few other frontiers for substantial urban growth in California, particularly when one takes into account the increasingly significant constraint of an available and adequate water supply.

With increasing urbanization, managing growth while optimizing water resources will be a challenge. To coordinate this process requires an Imperial Valley-Mexicali database containing accurate information on a wide array of topics, such as land use, environment, health, industry, employment, growth, housing, and hydrology.

Currently, much of the information is inaccurate, inconsistent, difficult to find and of poor quality.

Future growth in the Imperial Valley may not come about exactly as described in the above discussion. Considering the projected population growth for California during the next 50 years, however, a substantial population increase in the Imperial Valley is inevitable. Thus, at the beginning of the 21st century, the Imperial Valley is poised to become California's last urban frontier

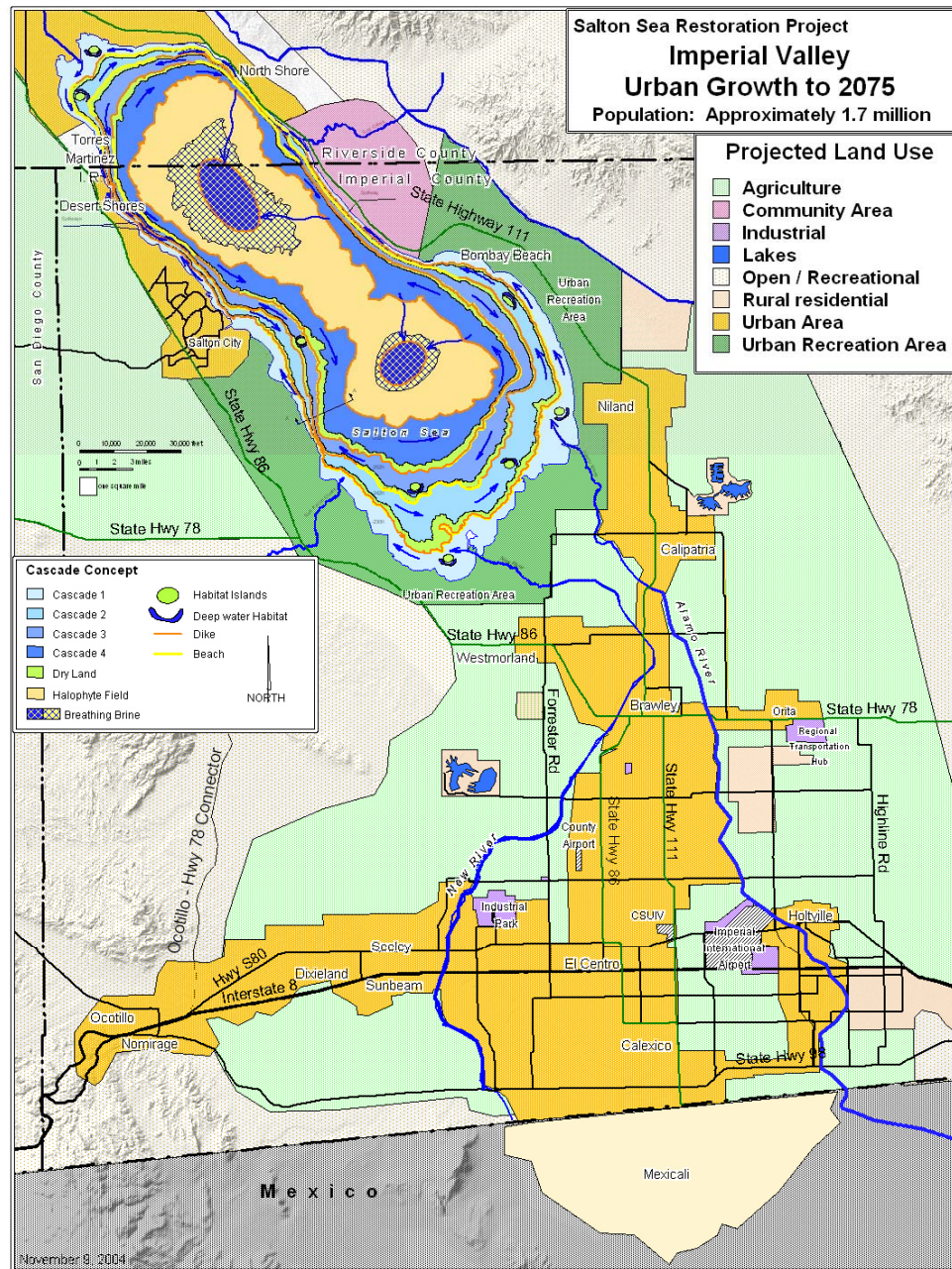


Figure 3

Simulation Model Formula

This simulation approach is based on the report from White, Engelen and Uljee, published in Environment and Planning B: Planning and Design 1997 volume 24, page 323 - 343, under the title: **"The use of constrained cellular automata for high-resolution modeling of urban land-use dynamics."**

The transition potential:

$$P_{hj} = v * a_j * s_j * \left(1 + \sum_{k,i,d} m_{kd} * I_{id}\right) + H_j$$

where:

P_{hj} = is the transformation potential from state h to state j .

$$v = 1 + [-\ln(rand)]^\alpha$$

This is the stochastic disturbance term.

$$a_j = \left(1 + \frac{D}{\delta_j}\right)^{-1}$$

Where D is the Euclidian distance from the cell to the nearest cell of the network (e.g. infrastructure, like streets,..)

δ_j is the coefficient expressing the importance of accessibility for the desirability of the cell for land-use activity j .

Note that accessibility is defined strictly locally, in terms of distance to the network, rather than globally in terms of distances through the network to distant points.

s_j is the suitability of the cell state for j , $0 \leq s_j \leq 1$.

m_{kd} is the weighting parameter applied to cells with state k in distance zone d .

$$I_{id} = \begin{cases} 1, & \text{if the state of cell is equal to } k, \\ 0, & \text{otherwise,} \end{cases}$$

where i is the index of cells within the distance zone d (I_{id} simply selects the proper weight, m_{kd} , to apply to the cell at location i, d);

H_j is an inertia parameter, with $H_j > 0$ if $j = h$, and $H_j = 0$ otherwise.